

## **SITE CHARACTERIZATION FOR SITES CONTAINING ORDNANCE**

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### **Abstract**

The issue of characterization on OE sites has lately been controversial. The issues range from how to establish goals of characterization, how much characterization is required to meet specific goals, and how to communicate the information gained during characterization. This paper will cover a U.S. Army Corps of Engineers characterization process used and being developed. The paper will also discuss some of the issues concerning the process.

### **Introduction**

The U.S. Army Corps of Engineers (USACE) has been conducting response actions on ordnance and explosives (OE) sites for several years. The processes used to characterize the site for OE concerns have evolved over that time.

### **Process**

The process currently being developed for use (and is being used on some sites) is shown in Figure 1.

#### *Technical Project Planning Process*

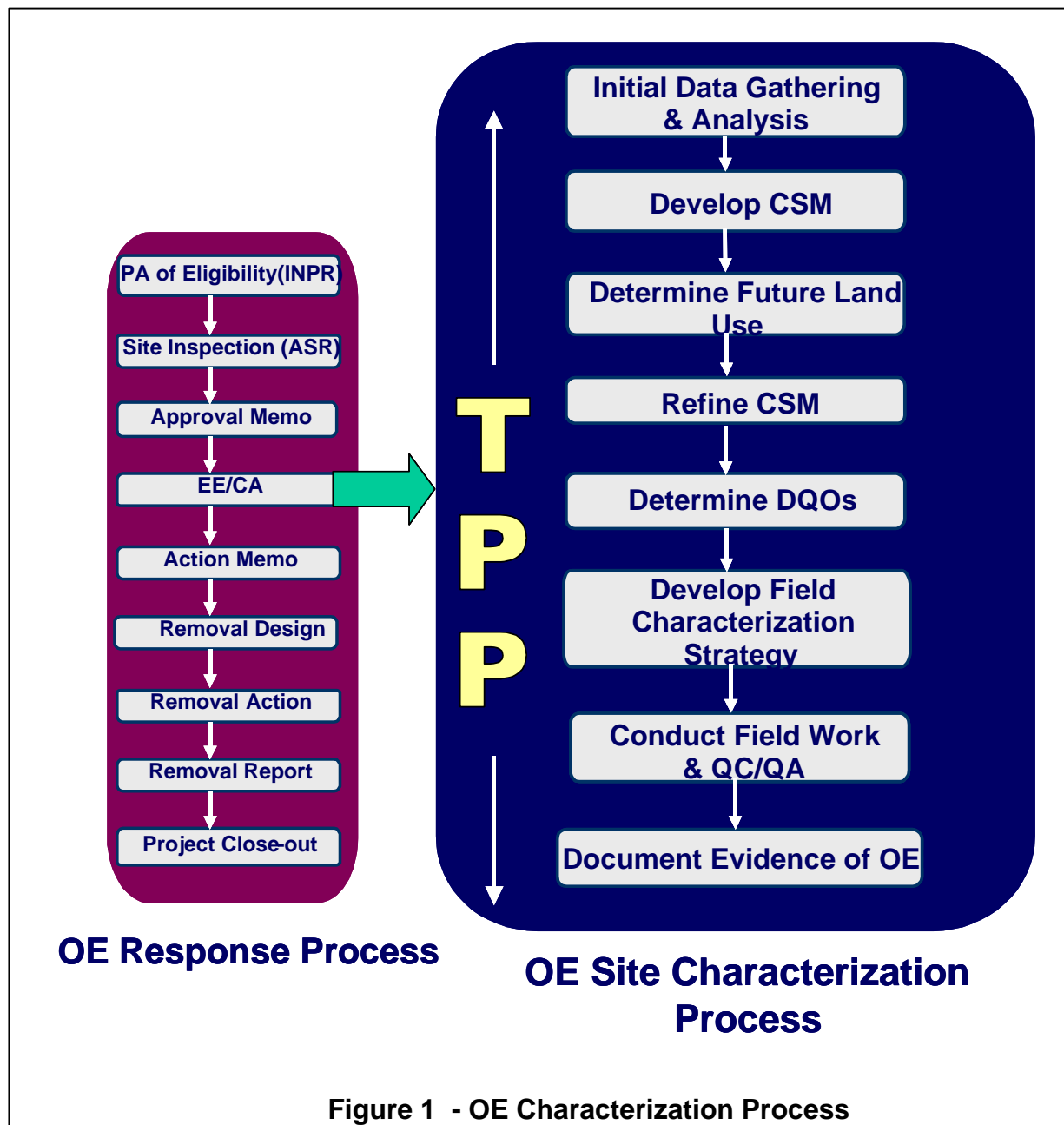
The process hinges on the Technical Project Planning (TPP) process. TPP is a systematic project planning process, which provides for stakeholder and regulator input into developing the project objectives and characterization. TPP is not a characterization step but a thread woven throughout the characterization process.

While the TPP process has been applied to hazardous, toxic, and radiological waste (HTRW) projects, it is a relatively new process for OE projects. USACE is currently working on interim guidance for application of the TPP process to OE projects. USACE is also applying TPP to some OE projects as test cases.

### *Conceptual Site Model*

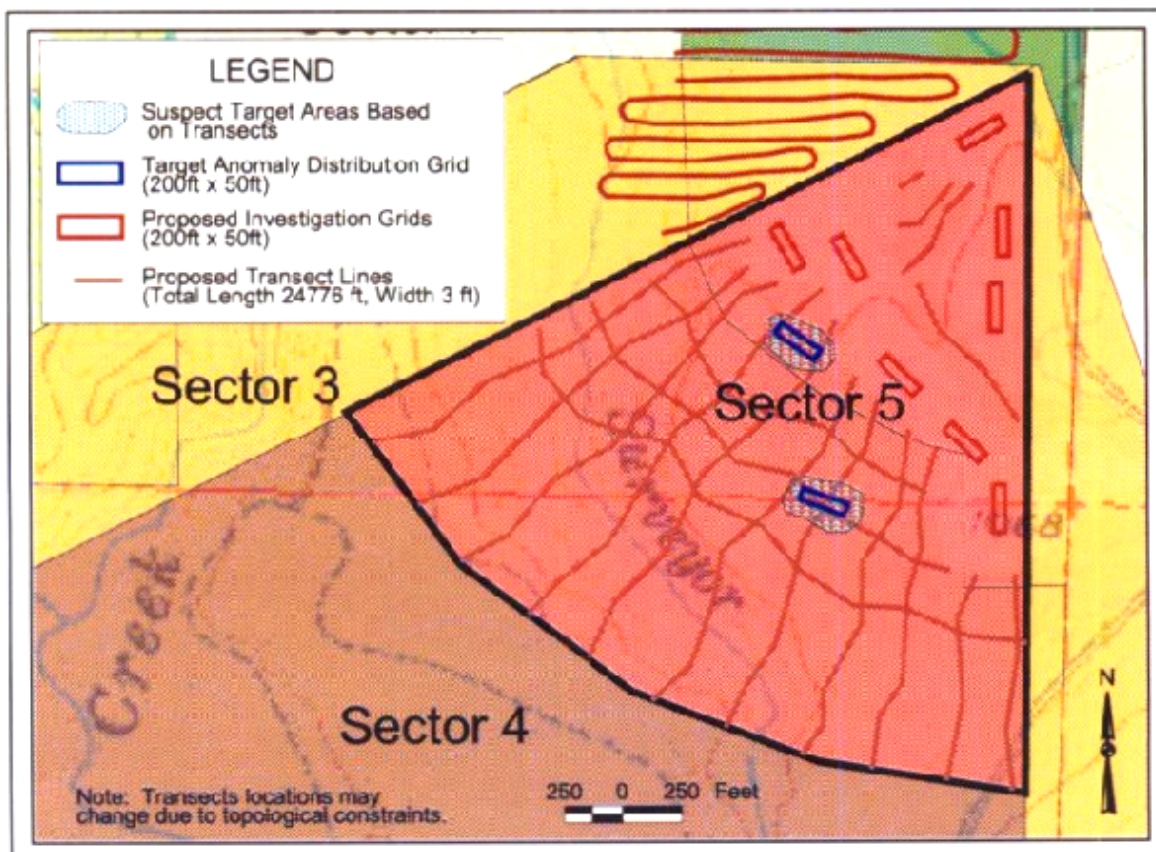
The Conceptual Site Model (CSM) is the essential framework for presentation of the OE site characterization results at any stage of the Engineering Evaluation and Cost Analysis (EE/CA) process.

The CSM is first developed based upon the existing data from the Archives Search Report and (if conducted) the Recon efforts. The CSM depicts in graphical, tabular, and/or textual format what the project team knows about the site as it relates to the OE project. The CSM is further modified based upon the determined land use(s) for the site.



The CSM divides the site into sectors, which have the same former land use, future land use, and land features (Figure 2). This first CSM is to aid in the preparation of the characterization plans for the project. The CSM should readily indicate those areas in which to focus the characterization efforts.

The CSM is updated as data is gathered for the project. The site model can be updated as late as after the removal action, in order to support institutional controls, recurring reviews, and other long-term actions.



**Figure 2 – Conceptual Site Model**

#### *Project and Data Quality Objectives*

Once the CSM is initially prepared, the project objectives are established based upon the proposed land use and stakeholder and regulator input. The objectives may be limited by the available technologies to be used during the response

Once the project objectives are established, the project team determines the site characterization required to assess response alternatives to meet those

objectives. This is commonly referred to as determining the Data Quality Objectives (DQOs). In this process, the data needs, the methods of data collection, and the process for evaluating and maintaining the accuracy of the data are determined.

One thing to be careful of during this process is to separate the data required to assess and evaluate the response alternatives for selection from the data required to effectively design the potential responses. The EE/CA supports response selection and decision-making and therefore is part of the administrative record for the project. Only those documents related to a response decision made or an action taken is part of the administrative record.

Some data is required to design the response alternative, but is not used analyze or select a response alternative. This data would not be included in the EE/CA report but may be included in another report and placed in the information repository. The documents composing the administrative record may be part of the information repository but not all documents in the information repository are in the administrative record.

### *Characterization Tools*

There are several methods of data gathering that can be used on an OE project. These include, but are not limited to, site walks or inspections, interviews, aerial photography, historical records searches, and geophysical surveys (both statistically and non-statistically based). The objective of the characterization process is to find, to some prescribed level of precision, indicators of OE or lack thereof. Table 1 presents some examples of indicators for OE and indicators for lack of OE.

### *Statistically Based Geophysical Survey*

Statistically based geophysical surveys, commonly performed using GridStats/SiteStats or Unexploded Ordnance (UXO) Calculator, have been of great interest and controversy, lately. The issues include the belief that the output of these tools is used solely to select a response alternative, and more critically, to determine that there is no further action required.

First, the output of these tools should never be used by itself to select a response alternative. Second, these tools should never be used to prove a site clean. At best the output can indicate that a site has a very low probability for containing UXO, and only if the tool assumptions are met. The difficulty in 'proving' that the assumptions are correct will make even this ascertain difficult.

Statistically based surveys should be used only if:

- The site or area contains or is suspected of containing UXO that is randomly dispersed (not uniformly), and

- A prediction of density is required to a relatively high level of precision for either response alternatives analysis or response design.

Statistically based surveys should not be used to locate hotspots or burials.

Often the precision provided by the statistically based geophysical surveys is used only in response design, and a lesser precision estimate could be used for response alternatives analysis. If a lesser data precision is acceptable, do not include the results of a statistically based survey in the EE/CA. Provide this data to the response designers in another document.

It should be noted that the Department of Defense (DoD) has directed USACE to partner with the Environmental Protection Agency (EPA) on the use of statistical methods on OE projects. This partnering is ongoing.

<b>Positive Indicators of OE Presence</b>	<b>Indicators of lack of OE Presence</b>
<ul style="list-style-type: none"> <li>• <b>Scarring of land</b></li> <li>• <b>OE scrap</b></li> <li>• <b>Historical records of OE related use</b></li> <li>• <b>Land features indicating OE related use</b></li> <li>• <b>Vegetation patterns indicative of OE related use</b></li> <li>• <b>OE found</b></li> <li>• <b>Eyewitness accounts of OE use</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>No scarring of land</b></li> <li>• <b>No OE scrap</b></li> <li>• <b>No OE related use indicated in records</b></li> <li>• <b>Land features do not indicate OE related use</b></li> <li>• <b>No indicative vegetation patterns of OE related use</b></li> <li>• <b>No OE found</b></li> <li>• <b>No eyewitness accounts of OE use</b></li> </ul>

**Table 1 – Indicators of OE**

## **Communication/Reporting**

A significant portion of the difficulties experienced concerning characterization is probably caused by poor communication.

One notable issue is how data indicating a lack of OE is presented. Often, the EE/CA states that there was no evidence of OE found, therefore no further actions are indicated. A better statement would be that an analysis of site data indicates that there is a very low probability of OE on the site. An even better statement would list the indicators of OE presence (if any), the lack of OE presence, and how/why the recommendation of no further action was made based upon those indicators.

While it is often the least interesting portion of the project, at least as much attention should be given to communicating the results of the characterization as that which was given to gathering and analyzing the data.

## **Conclusion**

The U.S. Army Corps of Engineers is continuing to strive to improve the characterization processes that used on OE projects. USACE is working on a new engineering manual on OE site characterization, which will hopefully be completed in the next year. USACE is partnering with EPA on statistical methods in order to improve their use and to come to a common understanding of their use. USACE is also conducting limited partnering on other characterization issues and is dedicated to continue these and other discussions in the effort to improve the processes and to come to common understanding of the processes.